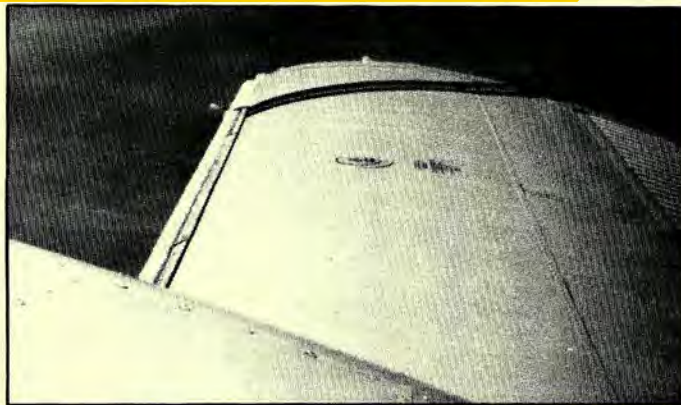


TKS broadens its horizons

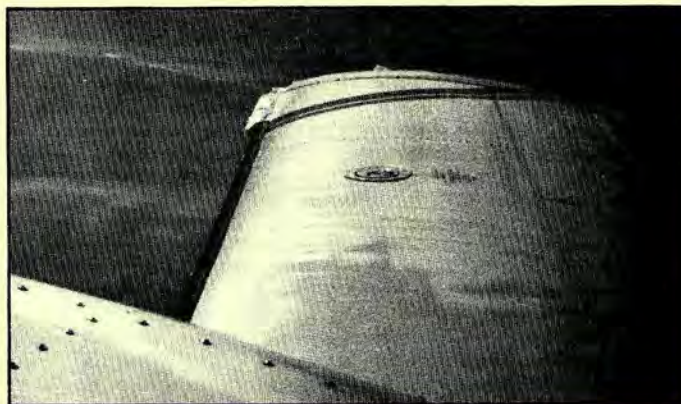
TKS, maker of liquid de-icing equipment, is steadily expanding its horizons in general aviation and other fields. The system is approved on several light twins, with others pending; work on the 125 continues at a good pace; and TKS is talking to several big manufacturers with a view to future installations.

TKS's system uses a series of porous stainless steel panels for leading edges, exuding glycol-based fluid. Either an anti-icing mode (giving a protective film) or de-icing mode (chemically breaking the bond of existing ice) is possible. It has several major advantages for general aviation and especially light aircraft, a principal one being the flush fit, which means minimal drag and performance penalty. Dry weight can be around half that of a pneumatic system; power demand for the electric pumps is typically 60W, and can be met by an aircraft battery in an emergency; and it is very simple to use, not requiring the pilot to wait for the right thickness, as with pneumatic boots. TKS also claims that with normal use the system can last the lifetime of the aircraft. Experience has shown that a panel (average length 30in) still works if dented, although will need replacing if badly distorted.

TKS itself was formed in 1942, although it has nearly 50 years' experience of ice protection work in conjunction with parent company Kilfrost. An early system of



Before and after: the light twin wing above is seen with a 1in ice layer. Below is the same wing 2min 15sec after switching on the TKS strip



porous strips recessed into leading edges was first fitted on the Avro York, later seeing use in such venerable types as the Viking, Tudor, Dove, Hermes, and Bristol Freighter. The present-day system was introduced on the Twin Pioneer in 1953 and aircraft since then have

included the Shackleton, Corvette, and VFW614. Current aircraft include the Sea King and Skyvan, with the 125 accounting for the biggest proportion of business.

Light twins currently approved for flight into icing with the system are the Gulfstream Cougar and Beech Duchess, although approval is pending for a system on the Piper Aztec and Seminole, plus Partenavia P68B. Day weight of the whole system—panels, nylon tubing, pumps and tank—is an average of around 40lb. Tank size is a large 10gal on the Cougar, but more usually around 3gal. Average cost for a light twin is £6,000, plus about £1,000 for installation. This covers wings, tailplane, fin, and propellers, to which the liquid is piped via slip rings. The liquid itself is basically 80 per cent mono-ethylene-glycol and 20 per cent de-ionised water, although the exact composition of TKS's own brew is a company secret.

Looking to the future, Piper, Cessna, and Mooney (the latter with the M30 pressurised single) are among most of the major GA manufacturers to whom TKS is talking about new installations.

TKS has recently been involved with a Nasa Langley laminar flow research programme. Results showed it to be the only de-icing systems that could be tolerated on the particular aerofoil sections under consideration. A not entirely unexpected bonus showed up by the trials is the system's apparent ability to induce bug removal from critical leading edges.

The company is also involved in a project study for a major airliner manufacturer concerning a very efficient 150-passenger design. Standard de-icing using engine bleed-air has been discarded because of engine power losses, and TKS is the baseline system for comparison with other methods. Bleeding hot air for de-icing can be measurably expensive when ultimate fuel efficiency is being sought. The fuel uplift for one popular type of medium-sized airliner is an extra 800lb per flight hour if flight in known icing conditions is predicted.

Windscreen de-icing

Apart from these serious research projects, which look like bearing fruit for the future, TKS has another more immediate project in investigating use of its own patented liquid (TKS 80) in alcohol windscreen de-icer panels used on the Twin Otter. Use of the latter system is to be discontinued following a nasty accident in Canada where a leak led to an in-flight fire. The pilot managed to force-land the aircraft but was burned so badly he is unlikely to fly professionally again. Substitute electric windshield panels are expensive, (around \$11,000 per installation), but the TKS liquid, which is inflammable, could be used



TKS strips are fitted to the deflector shields in front of the air intakes on many Sea Kings. They proved to be valuable assets in the frequent icing conditions of the Falklands conflict.

continued on page 648

with existing equipment. Wind-tunnel and flameability trials have been successful.

Procedures for installing the equipment in "new" types are now well-established. The aircraft's leading-edge profile and size is measured, and its stagnation point determined at various angles of attack. Size of panels is then decided, and the internal "plumbing" arranged to suit the particular structure. For each panel a supply pipe and air bleed is required, via small tubes in the leading-edge skin which normally do not affect structural integrity. Civil Aviation design approval is held for this sort of work. Elstree-based Cabair has been involved with several installations having overseen work on five Cougars, a Seminole, and P68.

Flight trials

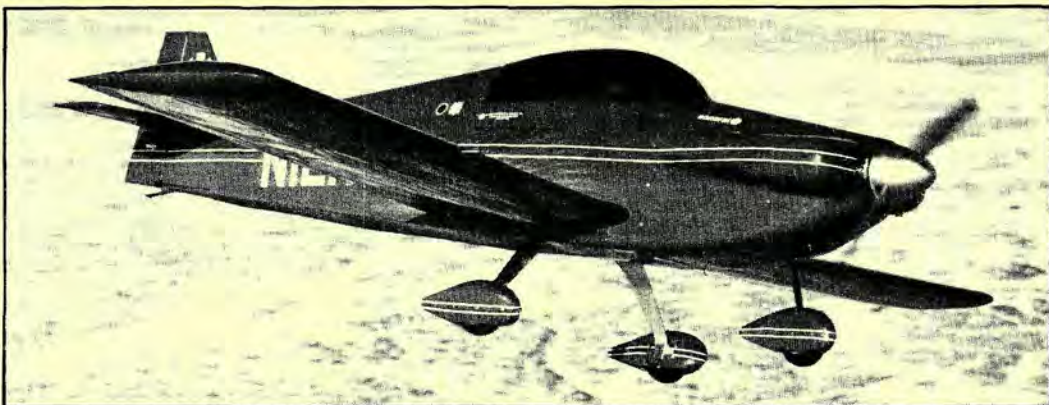
Before installation, a datum flight is made to establish performance figures for the aircraft. It is then flown "dry" with the installation fitted but not in use, and then with the system working in clear air to check its flow distribution. The leading-edges are painted in crack-detecting fluid for this. One of the bonuses from a liquid system such as this is the "spread back" over the surface.

The effect on performance naturally varies with type but is generally negligible. In the original Duchess trial, for instance, the system added merely 1kt to the landing-configuration stall, and took just 40ft off the single-engined climb rate at 3,500ft.

Several installations for single-engine aircraft are being investigated at present, and the advent of several new American aircraft in this area could well bring TKS a lot more business. As it is, the company expects at least to triple its turnover by 1984 with present commitments and future projects.

TKS is at 77 Church Road, Ashford, Middx, TW15 2PE; tel 07842 45067, telex 53228 K FROST G.

The US sales representative is Kohlman Aviation Corp., RR4, Box No IOOC, Laurence, Kansas 66044, telephone 913 843 2759.



A tricycle version is now available of the Sonera II homebuilt design from Monnett Experimental Aircraft (Oshkosh, Wisconsin). Engine is still a Volkswagen conversion

Composite homebuilt launched

SAN ANTONIO

A composite four-seat homebuilt design, is now being flight-tested from San Antonio, Texas. The West Air 204T has a low-wing tailwheel configuration and has been developed over the last four years by Western Aircraft. Engine is a 200 h.p. Lycoming, turbocharged and fuel-injected, driving a constant-speed propeller.

Gross weight is 2,725lb with an empty weight of 1,400lb, and cruise speed is expected to be more than 200 m.p.h. with a possible range of 1,400 miles. A tricycle gear version is planned, and later aircraft could have a 285 h.p. engine.

The company is at 10718 Sentinel, San Antonio, TX 78217; tel (512) 655-6813.

Briefings...

The US Aircraft Owners and Pilots Association now has a record membership of 265,000. Pilot licences issued last year were up 14.1 per cent on those for 1981, bearing out Aopa's optimism reported in these columns last week.

The Canadian International Air Show will be held at Toronto from September 2-5, 1983. Enquiries to Queen Elizabeth Building, Exhibition Place, Toronto, Ontario M6K 3C3.

Transpolar record planned

SAN FRANCISCO

Brooke Knapp plans to make a round-the-world flight via the poles, following her world transglobal record flight in a Learjet 35 (reported in World News last week). The existing polar record is 54hr 12 min, set by a Pan Am Boeing 747 in 1977 from San Francisco. Total distance was some 26,382 miles. Knapp needs an aircraft with longer range than the Lear 35. A Learjet 55, Falcon 50, or Gulfstream III is being considered, and average stage length could be as much as 4,000 miles.

The newly established record of 50hr 22min 42sec, covering some 19,874 n.m., has been approved by the US National Aeronautic Association and has been submitted to the FAI, along with 11 other speed records over courses en route. Class was C1F (Group III), covering the 6,000-9,000kg weight class. It beat a nearly 13-years-old

record set by Henry Beard in a Learjet 24, taking 65hr 38 min.

Brooke Knapp flew with two copilots and a ground engineer. Eleven scheduled plus one unscheduled landings were made. Usual cruise altitude was 40,000ft.

About 800 n.m. after take-off from Guam while en route to Majuro (1,611 n.m. away) a fuel transfer problem developed. After diverting to Ponape, crew chief James Mogill diagnosed a stuck transfer pump but managed to fix it, and refuel the aircraft, in 57min.

Apart from this, turn-round time ranged from 15-27min, with a best of 8min at Manila, including refuelling and replenishing supplies. Representatives of the British Women Pilots Association and Universal Weather (who arranged flight planning) were at London's Stansted Airport to meet the Learjet for a 3.55 a.m. arrival.

Schweizer is now marketing kits for the 1-36 Sprite sailplane. Prices range from \$12,995 for a complete kit. Schweizer is at PO Box 147, Elmira, N.Y.

